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PRE-APPEAL BRIEF REQUEST FOR REVIEW

Docket Number (Optional)

12480-000162/US

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Application Number

10/569,548

Filed

February 27, 2006

First Named Inventor

Kenzo MAHASHI, et al.

Art Unit

1795

Examiner

Edna WONG

Applicant requests review of the final rejection in the above-identified application. No amendments are being filed with this request.

This request is being filed with a notice of appeal.

The review is requested for the reason(s) stated on the attached sheet(s).

Note: No more than five (5) pages may be provided.

I am the

☐ applicant/inventor.

☐ assignee of record of the entire interest.
See 37 CFR 3.71. Statement under 37 CFR 3.73(b) is enclosed.
(Form PTO/SB/96)

☒ attorney or agent of record.
Registration number 34,313

☐ attorney or agent acting under 37 CFR 1.34.

Registration number if acting under 37 CFR 1.34 _____


Signature

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January 10, 2010

Date

NOTE: Signatures of all the inventors or assignees of record of the entire interest or their representative(s) are required. Submit multiple forms if more than one signature is required, see below*.

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PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicants: Kenzo MAEHASHI, et al. Conf. No.: 7724
Application No.: 10/569,548 Examiner: Edna WONG
Filing Date: February 27, 2006 Art Unit: 1795
Title: METHOD FOR CONTROLLING STRUCTURE OF NANO-SCALE
SUBSTANCE, AND METHOD FOR PREPARING LOW DIMENSIONAL
QUANTUM STRUCTURE HAVING NANO-SCALE USING THE METHOD
FOR CONTROLLING STRUCTURE
Atty. Dkt. No.: 12480-000162/US

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January 10, 2011

REASONS IN SUPPORT OF PRE-APPEAL BRIEF REQUEST FOR REVIEW

In response to the Final Office Action mailed September 8, 2010 and the Advisory Action mailed November 23, 2010, the following remarks are respectfully submitted in support of the Pre-Appeal Brief Request for Review in connection with the above-identified application. The Pre-Appeal Brief Request for Review is being concurrently submitted with a Notice of Appeal. Claims 1, 3-8, 11, 13-14, and 16-18 are currently pending in the present application, with claims 1 and 7-8 being written in independent form. Claims 2, 9-10, 12, 15, and 19-20 were previously cancelled without prejudice or disclaimer. Claims 7-8 have been withdrawn from consideration. Applicants respectfully request the designated panel of examiners (Panel) to review the propriety of the rejection of claims 1, 3-6, 11, 13-14, and 16-18.

Claim Rejections under 35 U.S.C. § 103 (Bokova + Irle)

Claims 1, 3-6, 11, 13-14, and 16-18 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over "*Laser-Induced Effects in Raman Spectra of Single-Wall Carbon Nanotubes*," Quantum Electronics, Vol. 33, No. 7, pp. 645-650, 2003 (Bokova) in view of "*Theoretical Study of Structure and Raman Spectra for Models of Carbon Nanotubes in Their Pristine and Oxidized Forms*," J. Phys. Chem. A, Vol. 106, pp. 11973-11980, 2002 (Irle). Applicants respectfully traverse this rejection for the reasons below.

The combination of Bokova and Irle neither discloses nor suggests the claimed invention. For instance, without conceding as to any of the Examiner's assertions that are not specifically addressed

herein, Applicants note that the combination of Bokova and Irle *fails*, as a preliminary matter, to disclose or suggest “**irradiating** the mixture of nano-scale low-dimensional quantum structures of differing densities of states with the electromagnetic wave in air for **two hours** after measuring the first Raman spectrum, the electromagnetic wave having an energy density of 10 kW/cm² so as to **selectively oxidize and remove** a low-dimensional quantum structure of a density of states **resonating** with the wavelength of the electromagnetic wave,” as recited by claim 1.

In the Final Office Action of September 8, 2010, the Examiner acknowledges that the cited art fails to disclose or suggest the “irradiating” so as to “selectively oxidize and remove” step of Applicants’ claim 1 but nevertheless attempts to assert that “[i]n method claims, the *intended result* is not given patentable weight when it simply expresses the intended result of a process step positively recited (MPEP § 2111.04).”¹ This assertion is a mischaracterization of MPEP 2111.04 and the case law cited therein.

MPEP 2111.04 merely instructs that, *depending on the specific facts of a case*, “adapted” to/for clauses, “wherein” clauses, and “whereby” clauses “*may* raise a question as to the limiting effect of the language in a claim.” In particular, MPEP 2111.04 notes the decision in *Minton v. National Association of Securities Dealers, Inc.*, 336 F.3d 1373, 67 USPQ2d 1614 (Fed. Cir. 2003). In *Minton*, the court held that “[a] whereby clause in a method claim is not given weight when it simply expresses the intended result of a process step positively recited.”² The pertinent claim language in *Minton* (that was not given patentable weight) recited an executing step of a method for trading securities, “*whereby* the security is *traded efficiently*.”³ Specifically, the Federal Circuit in *Minton* agreed with the district court that the “traded efficiently” phrase in the “whereby” clause of the “executing” step should not be given patentable weight, because “efficiently” is merely a “laudatory [term] characterizing the result of the executing step.”⁴

In view of the above, it is clear that the holding in *Minton* is not even applicable to the present facts for at least the following reasons. First, the “irradiating” so as to “selectively oxidize and remove” step of Applicants’ claim 1 does not even include the “whereby clause” that was in the claim litigated in *Minton* (nor does Applicants’ claim 1 include any of the other clauses noted in MPEP 2111.04). Second, unlike the situation in *Minton*, the “selectively oxidize and remove” limitation in Applicants’ claim 1 is not mere “laudatory” language. Rather, the “selectively oxidize and remove” language in Applicants’

¹ *Final Office Action (09/08/2010)*: p. 3, ln. 5-20 (reiterated on p. 3, last par., of Advisory Action of November 23, 2010).

² *Minton v. National Association of Securities Dealers, Inc.*, 336 F.3d 1373, 1381, 67 USPQ2d 1614, 1620 (Fed. Cir. 2003).

³ *Id.*; US 6,014,643 (claim 1, executing step).

⁴ *Id.*

claim 1 actually defines *how* (extent) the “irradiating” step is performed. Thus, the Examiner has erred in not giving *full patentable weight* to the “irradiating . . . so as to selectively oxidize and remove” limitation of Applicants’ claim 1.

The Examiner also asserts that “the process of the prior art is the same as that of the claim” and concludes that, as a result, such a process “can reasonably be expected to yield products which *inherently* have the same properties.”⁵ Applicants respectfully disagree.

The Court of Appeals for the Federal Circuit has determined that inherency may not be established by mere probabilities or possibilities. “The mere fact that a certain thing *may* result from a given set of circumstances is not sufficient.”⁶ Instead, the Examiner, if relying upon the theory of inherency, must provide a basis in fact and/or technical reasoning to reasonably support a determination that the allegedly inherent characteristic necessarily flows from the teachings of the prior art.⁷

Based on the Advisory Action (p. 5, ln. 8-14) of November 23, 2010, the Examiner appears to have misinterpreted the “irreversible disappearance” teaching in Bokova (e.g., Abstract). In particular, the Examiner appears to be under the erroneous belief that the “irreversible disappearance” language in Bokova is referring to the removal of the nanotubes. To the contrary, the “irreversible disappearance” language in Bokova is merely referring to the irreversible disappearance of the breathing modes (lines in the 100 – 300 cm^{-1} region) of the Raman spectra (and not to the irreversible disappearance of the nanotubes themselves).⁸

As those ordinarily skilled in the art will readily appreciate, the Raman spectroscopy conducted in Bokova is based on the vibration of the carbon atoms of the nanotubes, wherein the various modes (e.g., breathing, tangential) reflect the vibration of the carbon atoms in various directions (e.g., radial, axial, circumferential). That being said, the addition of an atom or functional group onto a nanotube will affect its structure and, thus, the resulting Raman spectra. For this reason, the Raman spectra of the nanotubes of Bokova will change depending on the presence or absence of the atom or functional group (hence, the disappearance or reappearance, for example, of the breathing modes of the Raman spectra). This observation is corroborated by the teachings of Irle.

⁵ *Final Office Action (09/08/2010)*: p. 4, ln. 4; p. 6, ln. 6-7.

⁶ *In re Robertson*, 169 F.3d 743, 745, 49 USPQ2d 1949, 1950-51 (Fed. Cir. 1999).

⁷ *See In re Robertson*, 169 F.3d 743, 745, 49 USPQ2d 1949, 1950-51 (Fed. Cir. 1999); and *In re Oelrich*, 666 F.2d 578, 581-82, 212 USPQ 323, 326 (CCPA 1981).

⁸ Note that two important aspects of Raman spectra for nanotubes include the breathing modes (features of Raman spectra occurring between about 100 – 300 cm^{-1}) and tangential modes (features of Raman spectra occurring between about 1500 – 1600 cm^{-1}); *E.g.*, *Bokova*: p. 646, right col., FIG. 3 and accompanying text; p. 646, right col., 1st par., ln. 1-3; p. 647, left col., ln. 7-8.

Irle expressly teaches that oxidation changes the structure of nanotubes and that, upon oxidation, the “calculated Raman spectra show large reduction in peak intensities, which can be attributed to the loss of cylindrical symmetry due to structural deformation.”⁹ In particular, Irle teaches that, when oxygen atoms react with the nanotubes, the structure undergoes a “large deformation from the totally symmetric cyclic structure toward an oval shape.”¹⁰ Thus, even though oxidation causes the resulting Raman spectra to exhibit “large reduction in peak intensities,” Irle clearly shows that the pristine nanotubes themselves do not disappear but, instead, merely become oxidized nanotubes.¹¹ As illustrated by Irle, the oxygen atoms merely bond with the nanotubes during oxidation so as to become part of the structure, thereby also causing the above-discussed deformation which affects its Raman response.¹²

In view of the detailed explanation of Irle, it is apparent that the large reduction in peak intensities (“disappearance”) of the breathing modes of the Raman spectra of Bokova are merely an indication of the compositional and structural changes experienced by the nanotubes (*as opposed to* the actual disappearance of the nanotubes themselves). By analyzing such changes to Raman spectra, Bokova indicates that “new information on the composition and electronic structure of materials” may be obtained.¹³

In sum, the reference to the “disappearance” and “appearance” of the breathing modes of the Raman spectra of Bokova merely exemplifies Irle’s observation of the sensitivity of nanotubes to compositional and structural changes.¹⁴ **To adopt the Examiner’s interpretation of “disappearance” as used in Bokova would mean that nanotubes are also being spontaneously produced when an “appearance” occurs.**¹⁵ Thus, the Examiner’s interpretation of Bokova is just not credible.

Even if the Examiner chooses to believe that the “irreversible disappearance” language in Bokova is referring to the actual removal of the nanotubes, Applicants note that the “power density of 10 kW cm⁻²” relied upon by the Examiner is in connection with section “3.2 *Reversible* changes in Raman spectra of single-wall carbon nanotubes caused by laser radiation” (*as opposed to* section “3.1 *Irreversible* changes

⁹ Irle: Abstract, second to last sentence; p. 11977, right col., last par., ln. 2-3; p. 11978, FIG. 4 and accompanying text; p. 11979, left col., last two lines; p. 11979, right col., section V, last sentence of first par.

¹⁰ Irle: Abstract, ln. 8-9; p. 11975, right col., ln. 6-7, 50-51; p. 11976, left col., last sentence of first full paragraph; p. 11979, right col., first par. of section V, ln. 17-19.

¹¹ Irle: p. 11974, Scheme 1; p. 11975, FIG. 1; p. 11976, FIG. 2; p. 11977, FIG. 3.

¹² *Id.*

¹³ Bokova: p. 649, right col., ln. 4-6.

¹⁴ *E.g.*, Irle: Abstract, last sentence.

¹⁵ *E.g.*, Bokova: p. 648, left col., ln. 44-46; p. 649, left col., last sentence of last full paragraph.

in Raman spectra of single-wall carbon nanotubes caused by laser radiation”).¹⁶ The only power densities disclosed in connection with section 3.1 (“*Irreversible* changes in Raman spectra of single-wall carbon nanotubes caused by laser radiation”) range from 0.05 – 0.56 kW cm⁻².¹⁷

Furthermore, the light in Bokova is merely used to produce a variety of Raman spectra. That being said, there is no credible reason why one ordinarily skilled in the art would have been motivated to just *arbitrarily* irradiate the nanotubes of Bokova for two hours, which greatly exceeds the time required for measuring a Raman spectrum (and, thus, would be a waste of energy). In asserting that the irradiation time is just a “result-effective variable,” the Examiner has failed to cite any references that even support such an assertion.¹⁸ In sum, Applicants would like to emphasize that the claimed invention is a method of structure control, which is distinct from the mere Raman spectra study of Bokova.

For at least the reasons above, a *prima facie* case of obviousness cannot be established with regard to claim 1. Consequently, a *prima facie* case of obviousness also cannot be established with regard to claims 3-6, 11, 13-14, and 16-18, at least by virtue of their dependency from claim 1. Accordingly, Applicants respectfully request the Panel to reconsider and withdraw the above rejection.

Conclusion

Should there be any matters that need to be resolved in the present application, the Panel is respectfully requested to contact Alex C. Chang, Reg. No. 52,716, at the telephone number below. If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies, to charge payment or credit any overpayment to Deposit Account No. 08-0750 for any additional fees required under 37 C.F.R. § 1.16 or under 37 C.F.R. § 1.17; particularly, extension of time fees.

Respectfully submitted,

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¹⁶ Bokova: p. 648, left col., ln. 42; p. 648, FIG. 6.

¹⁷ Bokova: p. 646, FIG. 3.

¹⁸ Advisory Action (11/23/2010): p. 6, ln. 4-9.